

## RELATION OF THE SOIL COLLOIDS TO THE CONDUCTIVITY OF THE SOIL.

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Soil conductivity can be measured qualitatively by the value  $R_4/R_0$  where  $R_4$  and  $R_0$  are the temperature ranges at the 4-inch depth and at the surface. The effects of weather changes—rain, snow, frost, surface mulch, evaporation, water content, and period—on  $R_4/R_0$  have been discussed in a previous paper, and if these changes are all eliminated a constant value for the ratio should be obtained in any soil. Experiments with sand and clay loam showed that this constant value was obtained in sand, but not in clay loam; in the latter soil it varies with changes of the mean soil temperature. Thus when all other weather changes had been eliminated, but the mean soil temperature varied between 10° C. and 22° C.,  $R_4/R_0$  for sand lay between 0.50 and 0.52, while for clay loam it lay between 0.37 and 0.45. Moreover, ignited clay loam behaved exactly like sand, showing that the cause of the variation was destroyed by ignition. It is suggested that the colloidal clay is the cause of this temperature coefficient of conductivity in clay soil.

## SUNLIGHT ENGINEERING.

The following is a brief abstract of a paper written by Mr. H. L. Seymour, entitled "Sunlight Engineering; Its Relation to Housing and Town Planning," and published in the "Journal of the Royal Astronomical Society of Canada," May, 1920:

Just as the astronomer feels certain that there are many bodies which he has not yet seen, so is it with the bacteriologist in his work. Every contagious and infectious disease is carried, as a rule, by a specific bacterium or similar organism. Now, the oxidizing action of direct sunlight and its accompanying drying properties are the greatest natural agencies in destroying disease or pathogenic bacteria. This is the strongest scientific argument that can be advanced, as far as housing is concerned, for direct sunlight. In a cubic meter of air taken from over the ocean there was found only one bacterium. In the same amount of air taken from a Paris hospital there were 79,000 bacteria. In the open air of the country there are fewer bacteria than in city air, which, as a rule, is shut off from direct sunlight.

Skylight comes from all directions of the heavens; sunlight from only one direction, constantly varying with the revolution of the sphere.

Second only to air is light and sunshine essential for growth and health. Sunshine is one of nature's most powerful assistants in enabling the body to throw off those conditions which we call disease. Not only daylight but direct sunlight is required; indeed, fresh air must be sun-warmed, sun-penetrated air. The sunshine of even a December day has been recently shown to kill the spores of the anthrax bacillus. This is no mean performance when one considers that bacterial spores or "seeds" are protected with a hard casing which renders them much more difficult to destroy than the parent bacteria. The following figures give the duration of life of the tubercle bacillus under various conditions:

In dark places.....	2 to 18 months.
Under diffuse daylight.....	6 to 24 hours.
In direct sunlight.....	10 minutes to 1 hour.

Besides being nature's great preventive from the spread of disease, the exhilarating effects of sunshine are recognized by everyone, and its beneficent effect upon public health and sanitation is well known.

In winter the intensity as well as the duration of sunlight is less than that of summer. City planning, as far as sunlight is concerned, is therefore the problem which most concerns the four months, October 21 to February 21, in the Northern Hemisphere. If ample sunlight can be provided during these four months the problems are with few exceptions solved.

Concerning the orientation of detached buildings:

(1) Isolated detached buildings should be constructed with their walls not square with the cardinal points of the compass, but at an angle therewith, preferably 45°.

(2) Detached buildings as usually grouped in rural and residential districts should be oriented as in (1) the streets on which they face running NE.-SW. and SE.-NW.

Concerning attached buildings:

(1) Long, narrow blocks with high buildings should have their lengths on streets running N.-S., as this condition is suited to intensive city development.

(2) Square blocks, with low, attached buildings, should usually be oriented so that streets make an angle of 45° with the cardinal points.

(3) Houses fronting on E. and W. streets should, if possible, be detached.

Heights of buildings should have some relation to the width between buildings and width of streets.—A. H. Palmer.

## DISCUSSION.

In connection with the above, attention is invited to a paper by the undersigned on "Variations in the total and luminous solar radiation with geographical position in the United States," in the MONTHLY WEATHER REVIEW, November, 1919, 47:769-793, and especially to pages 790-791.

In a table is given the possible duration of sunshine, at different latitudes and different seasons of the year, for vertical surfaces (1) square with the cardinal points of the compass and (2) at an angle of 45° therewith, and diagrams show the illumination intensity thereon in foot-candles. The advantage of orienting detached buildings and laying out city streets in accordance with (2) is pointed out. Within the limits of the United States each side of a building, and all streets, oriented in this way, may receive direct solar radiation for at least a short time on every day of the year; and in summer both the duration and the intensity upon the four sides of a building are fairly equable.—H. H. Kimball.

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ON THE RELATION BETWEEN THE NIGHTLY OUTGOING HEAT RADIATION, AND THE AMOUNT AND KIND OF CLOUDS.<sup>1</sup>

REVIEW.

The author calls attention to the paucity of data bearing upon the above relations and to their importance in obtaining a clear conception of the heat economy of the earth and of the balance between incoming and outgoing radiation. In the absence of a detailed treatment of the

<sup>1</sup> Asköf, Sten. Über den Zusammenhang zwischen der nächtlichen Wärmeausstrahlung, der Bewölkung und der Wolkenart. Geografiska Annaler 1920, H. 3.